

WHAT IS CLAIMED IS:

1. An ink jet printer comprising:

a printing unit having a carriage and a print head in which a plurality of ink jet nozzles are arranged in plural
5 columns, the printing unit printing on a printing medium while reciprocating the print head by the carriage for go-printing and return-printing;

a sensor disposed on the carriage and having a light-emitting portion for emitting light toward the printing
10 medium and a light-receiving portion for receiving reflected light from the printing medium;

a test pattern printing control unit that causes the printing unit to print a test pattern in which vertical ruled lines are arranged with a prescribed pitch;

15 a plural patterns printing instructing unit that causes the printing unit to print a plurality of test patterns while changing a test pattern printing interval of the return-printing with respect to the go-printing in plural stages;

20 a best pattern detecting unit for scanning-in the printed test patterns with the sensor and for automatically selecting a best test pattern from the scanned-in test patterns; and

a best pattern printing instructing unit that causes
25 the printing unit to print best test pattern related

information on the printing medium.

2. The ink jet printer according to claim 1, wherein the best pattern printing instructing unit causes the printing unit to print an additional test pattern on the printing medium at a test pattern printing interval that produces the best test pattern as the best test pattern related information.

3. The ink jet printer according to claim 1, wherein the best pattern printing instructing unit causes the printing unit to print information indicating a test pattern printing interval that produces the best test pattern as the best test pattern related information.

4. The ink jet printer according to claim 1, wherein the best pattern detecting unit comprises:
a sum-of-deviations calculating unit for calculating, for each of the test patterns, a sum of density deviations of a number of vertical ruled lines with respect to a density center value of the vertical ruled lines; and

a pattern selecting unit for selecting the best test pattern from the scanned-in test patterns, the best test pattern having the minimum sum of density deviations calculated by the sum-of-deviations calculating unit.

5. The ink jet printer according to claim 1, wherein the sensor is detectable at least one of a front end, a rear end, and a width of the printing medium.

6. The ink jet printer according to claim 1, further comprising:

a detection result judging unit for judging whether a detection made by the best pattern detecting unit is
5 appropriate; and

a re-detection executing unit that causes the printing unit to print the plurality of test patterns again while changing a printing condition and causes the sensor to scan the printed test patterns again when the detection
10 result judging unit judges that the detection made by the best pattern detecting unit is not appropriate.

7. The ink jet printer according to claim 4, further comprising:

a detection result judging unit for judging whether a
15 detection made by the best pattern detecting unit is appropriate; and

a re-detection executing unit that causes the printing unit to print the plurality of test patterns again while changing a printing condition and causes the sensor
20 to scan the printed test patterns again when the detection result judging unit judges that the detection made by the best pattern detecting unit is not appropriate.

8. The ink jet printer according to claim 7, wherein the detection result judging unit judges whether a
25 difference between a maximum value and a minimum value

among sum of density deviations of respective test patterns is not less than a predetermined value, and judges that the detection made by the best pattern detecting unit is appropriate when the difference is not less than the
5 predetermined value.

9. The ink jet printer according to claim 6, wherein the re-detection executing unit causes the printing unit to print the plurality of test patterns while changing a number of printing times, and the printing unit conducts
10 go-printing and return-printing for each line along a go/return direction a number of times equal to the changed printing times.

10. An ink jet printer comprising:

a printing unit having a carriage and a print head in
15 which a plurality of ink jet nozzles are arranged in plural columns, the printing unit printing on a printing medium while reciprocating the print head by the carriage for go-printing and return-printing;

a sensor disposed on the carriage and having a light-
20 emitting portion for emitting light toward the printing medium and a light-receiving portion for receiving reflection light;

a plural patterns printing instructing unit that causes the printing unit to print a plurality of test
25 patterns in each of which vertical ruled lines are arranged

with a prescribed pitch, while changing a test pattern printing interval of the return-printing with respect to the go-printing in plural stages;

a best pattern detecting unit for scanning-in the
5 printed test patterns with the sensor and for automatically selecting a best test pattern from the scanned-in test patterns; and

a best pattern printing instructing unit that causes
the printing unit to print best test pattern related
10 information on the printing medium.

11. An ink jet printer comprising:

a printing unit having a carriage and a print head in
which a plurality of ink jet nozzles are arranged in plural
columns, the printing unit printing on a printing medium
15 while reciprocating the print head by the carriage for go-printing and return-printing;

a sensor disposed on the carriage and having a light-emitting portion for emitting light toward the printing medium and a light-receiving portion for receiving
20 reflected light from the printing medium;

a test pattern printing control unit that causes the printing unit to print a test pattern in which vertical ruled lines are arranged with a prescribed pitch;

a plural patterns printing instructing unit that
25 causes the printing unit to print a plurality of test

patterns while changing a test pattern printing interval of the return-printing with respect to the go-printing in plural stages;

a best pattern detecting unit for scanning-in each
5 printed test pattern with the sensor and for automatically selecting a best test pattern from the plurality of test patterns; and

a best pattern printing instructing unit that causes the printing unit to print best test pattern related
10 information on the printing medium,

wherein the best pattern detecting unit comprises:

a sum-of-deviations calculating unit for calculating, for each of the test patterns, a sum of density deviations of a number of vertical ruled
15 lines with respect to a density center value of the vertical ruled lines; and

a sequential pattern selecting unit for selecting a test pattern scanned immediately before a test pattern that is currently scanned by the sensor as
20 the best test pattern when the sum of density deviations of the test pattern currently scanned is equal to or more than that of the test pattern scanned immediately before.

12. The ink jet printer according to claim 11,
25 wherein the sequential pattern selecting unit selects a

test pattern that is currently scanned as the best test pattern when the test pattern currently scanned is the last test pattern among the plurality of test patterns.